The
VETERINARY RECORD
Founded by William Hunting, F.R.C.V.S., in 1888

7, MANSFIELD STREET, PORTLAND PLACE, LONDON, W.1. MUSEUM 6541

No. 15 APRIL 9th, 1955 Vol. 67

Registered for Transmission as a Newspaper *Price: 2s. post free*

Contents

General Articles :

Industrial Molybdenosis of Grazing Cattle 273
J. C. Buxton, PH.D., B.SC., M.R.C.V.S.
Ruth Allcroft, PH.D., B.SC.

Molybdenum Poisoning (Teart) Due to Aerial Contamination of Pastures 276
W. H. Parker, B.SC., M.R.C.V.S., N.D.A.
T. H. Rose, PH.D.

The Efficacy of Berenil Against *T. congolense* in Zebu Cattle... 280
A. H. Milne, M.R.C.V.S.
J. Robson, B.SC., M.R.C.V.S.
T. Lwebandiza

Hypomagnesaemia in Ewes ... 281
H. L. Pook, M.R.C.V.S.

Current Literature :

Digest 282
Abstract 283

News and Comment 284

Correspondence :

Public Relations and the R.C.V.S. 286
F. J. Milne, D.V.M., M.R.C.V.S.

Pig Oedema 287
A. L. Walther, M.A., M.R.C.V.S.

Oldest Cow ? 287
K. G. Pitman, M.R.C.V.S.

Lungworms in Pigs : Specimens Invited 288
E. G. White, PH.D., B.SC., F.R.C.V.S.

Rabies in Germany 288
C. W. Wells, B.SC., M.R.C.V.S., D.T.V.M.

Pregnancy Toxaemia in Ewes ... 290
P. L. le Roux, D.SC., M.R.C.V.S.

Industrial Molybdenosis of Grazing Cattle

BY

J. C. BUXTON

Veterinary Investigation Laboratory, Sutton Bonington Loughborough

and

RUTH ALLCROFT

Ministry of Agriculture, Veterinary Laboratory, Weybridge

IT is now known that a high intake of molybdenum can reduce liver copper storage in cattle and under some circumstances can produce severe clinical symptoms of hypocuprosis. Ferguson, Lewis & Watson (1943) showed that excess of molybdenum in herbage was responsible for " teart," a severe scouring disease of cattle in parts of Somerset, and Allcroft (1952) reported hypocuprosis in cattle grazing " teart " areas. In 1945 Dick & Bull showed that an increased molybdenum intake could limit liver copper storage in sheep and cattle. Britton & Goss (1946) described a disease of cattle in California, similar to " teart," associated with excessive quantities of molybdenum in the pasture. Copper deficiency in sheep and cattle in New Zealand on pastures moderately high in molybdenum has been reported by Cunningham (1950) who suggested that molybdenum and copper are reciprocally antagonistic in animal metabolism. Later work by Dick (1952, 1953 a and b) has shown that molybdenum limits copper storage in the liver of sheep only when adequate inorganic sulphate is also present in the diet. The significance of this finding in relation to the general problem of copper metabolism remains to be elucidated. There is, however, ample evidence that a high molybdenum intake can produce severe scouring and unthriftiness in cattle, an effect which can be overcome by substantially increasing the copper intake of the animals (Ferguson, *et al.* 1943).

The following report describes a condition of scouring and poor thriving in cattle similar to that which occurs on " teart " pastures in Somerset. There were no outcrops of Lower Lias clay on the affected farms and soil conditions did not resemble those of " teart " areas described by Lewis (1943). The evidence presented indicates that the condition resulted chiefly from contamination of the pastures with molybdenum by a neighbouring factory and not from natural " teartness " of the herbage.

History and Symptoms

For many years farmers whose land lay within the vicinity of a particular industrial town had been aware of the difficulty of maintaining the health of their cattle, particularly during the grazing season. The disorder was most severe in an area lying to the north-east of the town and situated from one to two miles from its centre. To the east and west the condition occurred only intermittently, and farms to the south seemed to be unaffected. The incidence and severity of the disease showed marked variation throughout the grazing season and from one year to another. One of the worst outbreaks occurred during the dry summer of 1949, when severe effects were observed in dairy cattle of varying ages on two adjacent farms situated to the north-east of the town. In this part of the country it is the practice to turn cattle out to graze some time during April or early in May and in this year clinical evidence of disease was apparent during the fourth week of grazing, in the middle of May. The main symptoms were progressive emaciation accompanied in all cases by diarrhoea. At the end of July nearly all the grazing cattle on both farms were affected and a few animals showed advanced emaciation and scouring to a degree which necessitated their slaughter. On Farm No. 1 disease appeared to be associated with the grazing of certain fields situated on a southern slope facing the town, which, because of their situation, were exposed to contamination by smoke and fumes from chimneys of an adjacent factory manufacturing metal alloys. When removed to pastures not in the direction of the prevailing wind some improvement in the general health of the animals became apparent. A similar pattern of disease existed on the adjacent Farm No. 2, where substantial loss of condition and milk yield occurred in a herd of dairy cows, two of which were slaughtered in August. No real improvement in the clinical condition of the cattle occurred until they had been removed from what appeared to be dangerous pastures. One owner moved a number of his animals to distant grazing land rented for the purpose, whilst the other kept his cows indoors and from the third week of August fed them on a proportion of bought food. During the following winter a gradual, but very slow, improvement appeared in the cattle of both herds and by early spring most of the cattle on both farms were approaching normal health.

In several respects the clinical picture differed from that encountered in cattle in the usual types of wasting disease with enteritis. The onset of symptoms was strictly seasonal, was not confined to animals of any particular age group, since young as well as adult stock became equally affected, and appeared to be associated with the grazing of certain pastures. Investigation indicated that it was mainly confined to two neighbouring farms, the cattle populations of which never came in contact with each other, and although there seemed to be little likelihood of the commoner disorders being responsible, examinations for the presence of Johne's disease and parasitic infestation were carried out. The results were negative.

Because of the nature of the manufacturing processes of the adjacent factory and the clinical picture of affected cattle, the possibility of contamination of the pastures with molybdenum compounds escaping from the chimneys of the factory was investigated. It was also decided to examine the possibility of fluorine contamination as a complicating factor.

Samples

Blood samples were taken from cattle of all ages from both farms for estimation of copper and a few for estimation of molybdenum. Grass samples from "affected" fields and samples of foliage and bark from trees were collected from Farm No. 1 for estimation of copper, molybdenum, and fluorine; urine samples from cows on Farm No. 1 were also taken for determination of fluorine content.

Results

TABLE I

BLOOD COPPER VALUES OF CATTLE ON AFFECTED FARMS

Farm reference	Time of sampling	Number and description of animals	Cu mg. per 100 ml. blood	
			Mean	Range
No. 1	*Before treatment*			
	(*a*) 18.1.50	14 housed cows	0·04	0·01–0·07
	(*b*) 18.3.50	13 "	0·06	0·03–0·10
	(*c*) 19.5.51	8 grazing heifers	0·029	0·02–0·03
	After treatment			
	19.5.51	7 lactating cows	0·106	0·08–0·13
	23.8.51	10 cows at grass	0·09	0·06–0·11
No. 2	*Before treatment*			
	(*a*) 31.8.51	13 cows at grass	0·016	0·01–0·02
	(*b*) 20.10.51	5 " "	0·016	0·01–0·04
	(*c*) 24.10.51	9 yearlings at grass	0·028	0·01–0·05

(a) Blood Samples

Results in Table I show that very low blood copper values were found in all animals at grass on both farms—the figures for Farm No. 2 are very low indeed. A figure of about 0.1 mg. per 100 ml. blood is accepted as a common normal for cattle and anything below 0.07 mg. can be regarded as low. At the time the samples were taken on this second farm, the 18 cows had been grazing pastures of a southern slope for nearly five months and were emaciated and suffering from acute diarrhoea. The average milk yield on this farm had fallen to a very low figure and two cows had been slaughtered in a severely emaciated condition.

The blood copper figures for cows on farm No. 1 taken in March a few days before they were turned out to grass, show a general upward trend compared with those taken two months earlier in January, but this would be expected at the end of a period of stall feeding. The results in Table I also show the very marked increase in blood copper values which occurred in animals on farm No. 1 after a copperised cake had been fed for several months at a rate which supplied a daily supplement of 2 g. copper sulphate. This increase in blood copper levels was accompanied by a marked improvement in clinical condition and a cessation of diarrhoea.

Therapeutic treatment of cattle on farm No. 2 consisted of giving copper sulphate solution as a drench at weekly or fortnightly intervals, supplying 5 g. copper sulphate per drench. The effect of the first dose was rapid and spectacular, for within two days diarrhoea had ceased in nearly all cows and from then onwards marked improvements in bodily condition and milk yields were observed. Unfortunately no blood samples were obtained from this herd after treatment, but there was no doubt that it proved an entirely satisfactory as well as cheap method of controlling the disease even when the cattle continued to graze "affected" pastures. Although this form of treatment was a little more troublesome the farmer preferred it to using an expensive copperised cake.

A few blood samples from farm No. 1 were taken in May, 1951 for estimation of molybdenum after the cattle had been at grass for about three weeks. Values ranged from 0.05 to 0.21 p.p.m. with a mean of 0.12 p.p.m. These show a slight elevation from a common normal of 0.05 p.p.m., but since no herbage samples were collected at the time the blood samples were taken, it is not known whether or not the pastures were severely contaminated during that period.

(b) Herbage Samples.

On farm No. 1 pasture samples were collected from five fields as well as two samples of bark and one of foliage from trees for estimation of copper, molybdenum, and fluorine. Results are given in Table II.

TABLE II

COPPER, MOLYBDENUM AND FLUORINE VALUES FOR HERBAGE SAMPLES FROM FARM NO. 1

Sample	P.p.m. on dry matter Copper	Molybdenum	Fluorine
Pasture			
Field 1 ...	24	14	4
" 2 ...	26	40	4
" 3 ...	28	126	6
" 4 ...	28	84	4
" 5 ...	—	26	12
Tree bark (*a*)...	33	250	36
" (*b*)...	—	65	50
Foliage ...	—	18	32

The figures show molybdenum values well above normal for all the samples, those for fields 3 and 4 being particularly high, while the very high figures for the two samples of tree bark suggest aerial contamination. The fluorine figures for bark, tree foliage and pasture from field 5 are also above the normal range. The copper values too are at the upper end of the range usually found for herbage samples in this country.

(c) Urine Samples

Because of the rather high fluorine figures obtained on herbage samples (Table II) it was decided to examine urine samples from cattle on farm No. 1 for fluorine content. Samples were taken during December and January in spite of the fact that the animals had been housed for two months. Results are given in Table III.

TABLE III

FLUORINE CONTENT OF URINE SAMPLES FROM COWS ON FARM NO. 1

Cow	Fluorine p.p.m. corrected to sp. gr. 1·030
1	13
2	7
3	8
4	7
5	8
6	9
7	10
8	8
9	10
10	12
11	11
12	14
13	12
14	8

Although there was no evidence of gross fluorosis in the herd, it was noticed that two animals on this farm showed slight mottling of the incisor teeth. The urine fluorine figures in Table III are above the usual normal range of two to five p.p.m. for bovines, and values of 10 p.p.m. fluorine and above indicate the possibility of a mild degree of fluorosis. This is consistent with the mild teeth lesions noted, but no bone exostoses could be detected and there was no evidence of lameness. Since the clinical and biochemical evidence indicated a severe hypocuprosis and since the response to copper therapy was marked, the fluorine aspect was not investigated further.

Discussion

In the search for the origin of molybdenum contamination, the two most important factors were the nature of the industrial work in the area and the geographical position of the affected farms in relation to the factories. It seemed probable that contamination was coming from a south-westerly direction, along the track of the prevailing wind, from the industrial town situated one and a half miles distant.

Because of the position of the two affected farms in relation to the industrial works in the town, it seemed that one factory might be the chief source of contamination. Enquiry showed that this factory was engaged in the preparation of steel alloys, in some of which molybdenum is used. An interview with the management, followed by a tour of the works, elicited the information that fumes containing appreciable amounts of molybdenum could escape at times through the smoke stack.

It is realised that there are many gaps in the evidence presented in this report which could have been avoided had it been possible to carry out a more detailed investigation. The results do, however, suggest that at times molybdenum compounds, carried in smoke from chimneys of an adjacent metal-alloys factory, were deposited in amounts large enough to cause a severe hypocuprosis in grazing cattle. Whether the pastures on these farms contained factors which could produce a "conditioned" copper deficiency in the animals (Allcroft, 1952) in the absence of molybdenum contamination was not in-

(Continued at foot of page 276)

Molybdenum Poisoning (Teart) due to Aerial Contamination of Pastures

BY

W. H. PARKER

Veterinary Investigation Officer, Wolverhampton

and

T. H. ROSE

Advisory Soil Chemist, National Agricultural Advisory Service, West Midlands Province*

Introduction

THE fact that certain pastures in Somerset produced scouring and unthriftiness in cattle appears to have been known for a very long time, but the first recorded reference is that of Acland (1850) who defined the main area affected and drew attention to its association with the Lower Lias Clay. Clarke (1855) dealt with the matter in more detail and observed that while the disease was not quite co-extensive with the Lower Lias Clay, no fields outside this area were so affected. In a description of the symptoms and course of the disease, Muir (1936) states that scouring may occur from one day to six weeks after turning cattle on to the affected pasture, but records rapid improvement when they are brought inside. Ferguson, Lewis, & Watson investigated the condition in 1938 and reported the presence of abnormally high quantities of molybdenum in the herbage. They also demonstrated that symptoms similar to those described by Muir occurred in three out of five cows given soluble molybdates in quantities equivalent to 1.36 g. molybdenum per head per day, a quantity in line with the probable consumption on a badly affected pasture.

" Tart " or " teart " is the local Somerset name for the affected pastures. This suggests a sour soil of low *p*H, but Lewis (1943) records that the severest effects are associated with alkaline and neutral soils in which molybdenum content ranges from 10 to 100 parts per million. Ferguson *et al.* (1943) in further investigations give a range of 14 to 108 p.p.m. molybdenum in herbage as responsible for teart symptoms, 12 to 24 p.p.m. for mild symptoms, and 3 to 12 as occurring in normal pastures, and describe the use of copper as an antidote. The effect of molybdenum in the diet in depressing the storage of copper in the liver of both cattle and sheep has been observed in New Zealand by Cunningham (1950) who also records the fall in blood copper in cattle receiving experimental doses of 900 mg. and 1,800 mg. of molybdenum per week. In experiments at Weybridge and under natural conditions on teart pastures in Somerset, Allcroft (1952) confirmed these results in cattle.

Muir (1941) in a prophetic strain suggested the possibility of industrial teart but pointed out that industrial areas usually have acid soils which might prevent the appearance of teart symptoms in spite of molybdenum contamination of pasture.

Teart-like Conditions in the Midlands

There is an outcrop of Lower Lias Clay in South Warwickshire where teart is liable to occur, but this article deals with farmland in an industrial area situated on Keuper Marl and Glacial Sands and Gravel overlying Keuper Marl. The nearest outcrop of the Lower Lias is nine miles south-east of this drift-covered Triassic area and the molybdenosis problem described is therefore not associated with Lower Lias Clay.

* Since transferred to Wye, South-East Province.

Industrial Molybdenosis of Grazing Cattle (*concluded*).

vestigated. Even if this were so there is no doubt that the aerial deposits of molybdenum would cause much more rapid and severe symptoms of hypocuprosis than would have occurred on uncontaminated pastures. It is, however, very satisfactory that the cattle can now be maintained in good health on these two farms by the administration of adequate supplements of copper sulphate.

Summary

Evidence is presented which indicates that severe diarrhoea and loss of condition in cattle was attributable to a " conditioned " copper deficiency caused by the contamination of herbage by molybdenum compounds escaping with smoke and fumes from the chimneys of an adjacent metal-alloys factory. The disorder was cured and prevented by administration of copper sulphate to the cattle.

Acknowledgments.—We wish to express our thanks to Miss G. Lewis and Mr. C. W. Clarke for assistance with chemical estimations.

References

ALLCROFT, R. (1952). *Vet. Rec.* **64.** 17.
BRITTON, J. W., & GOSS, H. (1946). *J. Amer. Vet. Med. Ass.* **108.** 176.
CUNNINGHAM, I. J. (1950). " Copper Metabolism. A Symposium on Animal, Plant and Soil Relationships." Baltimore : Johns Hopkins Press. 1950. p. 246.
DICK, A. T. (1952). *Aust. Vet. J.* **28.** 30.
———. (1953a). *Ibid.* **29.** 18.
———. (1953b). *Ibid.* **29.** 233.
———, & BULL, L. B. (1945). *Ibid.* **21.** 70.
FERGUSON, W. S., LEWIS, A. H., & WATSON, S. J. (1943). *J. Agric. Sci.* **33.** 44.
LEWIS, A. H. (1943). *Ibid.* **33.** 52.

In the late summer of 1948 attention was drawn to a group of four dairy farms where severe scouring was occurring. The farmers blamed certain of their fields, in particular, and claimed that the scouring decreased rapidly if the cows were kept inside, but became worse as soon as the stock were turned out again. The geological formation was considered to rule out the possibility of teart, but a single analysis for molybdenum was carried out on herbage obtained from one of the fields (farm No. 3) by our colleague, Mr. C. D. Rickaby, and showed a figure of 77.5 parts per million on a dry matter basis. At this time the cattle were inside for the winter and the scouring had ceased. Further investigation was therefore postponed until the following summer, but it was observed that the farms were situated in an arc to the north and east of a group of three aluminium alloy factories, one of which was known to be using molybdenum. No trouble was reported in 1949 and 1950 and the investigation fell into abeyance; analysis of two herbage samples from farm No. 1 in April, 1949, gave relatively low figures of 3 and 10.5 p.p.m. molybdenum.

In 1951 severe symptoms reappeared on farm No. 1 situated to the north of the factories. Since there had been no scouring for two years the farmer did not at first suspect a recurrence of the earlier condition and looked for other causes. Some of the cows were badly affected while others exhibited little or no symptoms, but the situation was further complicated by the fact that two cases of Johne's disease had been diagnosed.

Symptoms, Analyses and Treatment

Farm No. 1

The affected cattle were scouring severely, giving little milk and losing condition and strength rapidly; depigmentation of the black portion of the Friesians' coats was observed. Herbage analyses confirmed the presence of excessive molybdenum on all grazing fields. Samples of herbage taken in September, 1951, from fields progressively farther from the factory starting with sample No. 1, showed high molybdenum values as follows:—

TABLE I

Sample	Molybdenum
1	40
2	50
3	35
4	25

Without waiting for a more orthodox method of administering copper, a solution of copper sulphate was poured on the feed each day. This was a first-aid measure and no record was kept as to the quantity used, but the cows showed a great craving for it and improvement was noted in less than a week.

In the following January, 1952, a cow affected with Johne's disease died and a sample of liver taken for estimation of copper gave a low value of only 9.7 p.p.m. on a dry matter basis. There was an unusual opportunity for an investigation in this herd as the farm was restocking, having decided to change over from Friesians to Ayrshires. Blood samples for estimation of copper content were taken in February, July, and November, 1952. The results are shown in Table II.

Of the 12 cows sampled in February, three were home-bred, five purchased in May, 1951, and four in October, 1951. Only the last group had normal blood copper values. No copper was administered during the winter months and on turning out scouring recommenced, but this was rapidly corrected by the addition of a copper sulphate solution to the feed as before. Later, a copperised cake was fed and no symptoms occurred during the summer months despite the fact that blood samples taken in July showed lower values than in February in every group. Four out of five cows purchased in March, 1952, had low blood copper values after only four months on the farm. The craving for the food containing copper sulphate was again observed and the intensity of the craving was related to the length of time the cows had been on the farm. Administration of copper supplements was continued after housing in October, and again the craving lasted longest in the cows which had been the greatest length of time on the farm. Blood samples taken in November had a normal copper content.

TABLE II

BLOOD COPPER VALUES EXPRESSED IN MG. PER 100 C.C.
FARM NO. 1

Group	Cow	22.2.52	2.7.52	4.11.52
Home bred ...	6	0·04 (sold)	—	—
	7	0·04	0·02 (sold)	—
	8	0·04	0·03 (sold)	—
Purchased May, 1951	1	0·04	0·03	0·10
	2	0·04 (sold)	—	—
	3	0·03	0·03	0·10
	4	0·04	0·02	0·10
	5	0·04	0·03 (sold)	—
Purchased October, 1951	15	—	0·07	0·08
	16	—	0·07	0·10
	17	0·09	—	—
	18	0·08	0·07	—
	19	0·10	0·07	—
	20	0·10	0·04	0·08
	21	—	0·06	—
	22	—	0·06	—
Purchased March, 1952	9	—	0·06	0·11
	10	—	0·07	0·10
	11	—	0·07	0·09
	12	—	0·11	—
	14	—	0·06	0·10

Farms Nos. 2, 3, *and* 4

The recurrence of trouble on farm No. 1 in 1952 naturally directed our attention towards the other three farms on which trouble had occurred in the original outbreak of scouring. We were informed that farm No. 2 farther away to the north-east had had no scouring, and no further investigation was undertaken there. Farm No. 3 to the east was definitely affected but the farmer was not greatly concerned. However, 10 representative blood samples were taken and were all below normal for copper, ranging from

0.03 to 0.07 with a mean of 0.038 mg. per 100 ml.; nine of the 10 animals had been on the farm at least 12 months.

The symptoms were not so severe on this farm as on No. 1, but there was a distinct similarity and blood copper values are comparable. In order to demonstrate the therapeutic effect of copper, six cows were injected intravenously with 250 ml. of a solution of copper sulphate containing 1 mg. copper per ml. immediately after blood-sampling. There was a cessation of scouring in these cows the next day and initially their milk yield fell, but this was followed by a steady rise in yield from the second day, and the farmer arranged within a fortnight to have copper sulphate added to the food of all the scouring cows with salutary effect.

Farm No. 4 was for a time a mystery. It adjoins the factories and lies between them and farm No. 2. It also adjoins the other two farms and might be described as the centre of the area, occupying the most vulnerable position of all, both by proximity to the factories and being in line with the prevailing wind. In 1948 the cattle on this farm were affected along with the others, but in 1952 no scouring occurred. The cows were in good condition and yielding well, although in a limited area the pasture was completely killed, and hedges, including hedgerow trees and oaks, were also killed. This was in marked contrast to farm No. 1 where vegetation was affected only slightly or not at all. Thus, two toxic effects appeared to be operating, one near the factories on plant growth but not on stock, and one at some distance on stock but not on plants.

Soil Analyses

Two fields on each farm were investigated during summer 1952. Samples from the surface turf and borings of the soil immediately below were taken for estimation of zinc, lead, nickel, molybdenum, cobalt, tin, vanadium, titanium, chromium, and silver. "Turf" for the purpose of this paper consists of the top two inches of soil and the accompanying vegetation after cutting away the grass above the surface. The lower sample of soil was taken from the succeeding four inches. The usual sampling procedures were employed except that a wooden auger instead of the conventional metal auger was used. The results are given in Table III.

The concentrations of molybdenum, zinc, lead, nickel, and vanadium are higher in the turf than in the soil samples except in O.S.49 from farm No. 4 where molybdenum is higher in the soil. The figures for lead and nickel are not considered high; nor was there any suggestion of poisoning of stock or plants by these metals. Field O.S.49 was cultivated and re-seeded in 1950 and this would have the effect of mixing earlier deposits of aerial contamination of molybdenum. Zinc, a relatively new contaminant, was much higher in the turf than in the soil. The relatively low figures in the soil as compared to the turf in the other fields, supports the suggestion of aerial contamination. So do the high herbage molybdenum figures of 1951 when compared with soil values that are in the normal range. Turf figures on farm No. 1 ranging from 1.9 to 2.4 p.p.m. are above the normal range. Unfortunately, no herbage analyses were carried out at the same time as the soil analyses. As the problem was one of aerial contamination it is probable that the herbage, as in the samples examined in 1948 and 1951, would have yielded figures comparable with those obtained by Ferguson and his co-workers on the teart pastures of Somerset.

The high zinc contents of turf and soil in O.S.49 leave no doubts as to the cause of the herbage and trees dying since it is well known that excessive zinc contamination is harmful to crops (Knowles, 1945). This effect was also shown on experimental reference plots laid down at the West Midlands Provincial Headquarters to test the effects of heavy metal toxicity. Application of 180 to 400 p.p.m. of zinc to the soil proved inimical to plant growth in the year of application and the effects of the highest application of zinc persisted for two to three years.

It was not easy to explain why the stock on farm No. 4 showed no signs of teart. Subsequently, however, determinations of the "available" copper in the soils were made with the results given in Table IV. "Available" copper was taken as that extracted in $\frac{n}{2}$ acetic acid. It is interesting to note the higher figures for available copper in the field (O.S.49) which was adjacent to the factory and where no teart symptoms occurred in spite of the high molybdenum figures for this field. The high copper figures might have been considered to be due to the heavy application of sewage sludge to the farms in this area

TABLE III

ANALYSES OF TURF AND SOIL SAMPLES EXPRESSED AS P.P.M. ON OVEN DRY MATERIAL

		Acetic acid extracts									Neutral ammonium acetate extracts (*p*H 8)
		Zn	Pb	Ni	Co	Sn	V	Ti	Cr	Ag	Molybdenum
Farm No. 1	**O.S. 187 turf**	80	3·5	3·6	0·65	1·4	0·57	0·5	0·33	<0·05	2·1
	O.S. 187 soil	30	2·6	1·9	0·27	1·4	0·34	0·5	0·87	<0·05	0·5
	O.S. 187 turf	80	3·0	3·7	0·92	1·5	0·50	0·5	0·29	<0·05	2·4
	O.S. 187 soil	35	2·8	3·3	0·96	1·8	0·36	0·5	0·27	<0·05	0·8
	O.S. 220 turf	70	3·0	3·1	0·40	2·0	0·96	0·5	0·26	<0·05	1·9
	O.S. 220 soil	30	2·0	2·0	0·68	1·4	0·19	0·5	0·29	<0·05	1·1
	O.S. 220 turf	60	2·8	3·3	0·62	1·9	1·38	0·5	0·26	<0·05	2·1
	O.S. 220 soil	40	2·4	3·3	1·00	1·4	0·31	0·5	0·26	<0·05	0·3
Farm No. 4	**O.S. 49 turf**	2,600	7·6	7·3	0·96	1·4	0·96	1·0	0·52	<0·05	31·5
	O.S. 49 soil	1,050	7·3	6·9	1·30	1·1	0·94	1·0	0·42	<0·05	40·8
	O.S. 182 turf	130	5·4	2·6	1·00	1·2	0·23	0·5	0·24	<0·05	1·2

several years previously, but such an explanation would only raise the more intractable question of why scouring was not inhibited in the cows in 1948. Subsequently, enquiries about factory activities were made, and it was found that while one factory was using molybdenum, one of the other two had started a new process involving a loss of copper into the atmosphere.

TABLE IV

PARTS PER MILLION COPPER EXTRACTED IN $\frac{n}{2}$ ACETIC ACID		
Farm No. 1 ...	O.S. 187 turf	3 p.p.m.
	O.S. 187 soil	5 ,,
	O.S. 187 turf	4 ,,
	O.S. 187 soil	5 ,,
	O.S. 220 turf	5 ,,
	O.S. 220 soil	4 ,,
	O.S. 220 turf	3 ,,
	O.S. 220 soil	3 ,,
Farm No. 4 ...	O.S. 49 turf	36 ,,
	O.S. 49 soil	15 ,,
	O.S. 182 turf	3 ,,

Discussion

Agriculture in the industrial Midlands carries a number of hazards and damage to crops or stock is not new, but this appears to be the first recorded case of molybdenum poisoning. The intermittent appearance of symptoms and the variation between farms was at first puzzling, but there were several factors which helped to explain this. Though analyses of herbage and soil were unfortunately not made concurrently, the results suggest that molybdenum contamination was superficial, for only one field shows a high soil content, and here there was a ready explanation in that ploughing had taken place two years previously. Superficial contamination of pastures must vary greatly, depending on the force and direction of the wind, the amount of molybdenum being used at any time and the efficiency of the factory in preventing aerial loss.

One of the most extraordinary features was the lack of evidence of molybdenum poisoning on farm No. 4 in 1952, for it appears from soil analyses to be seriously contaminated with molybdenum even from the figures in Table III which probably do not show the full extent of the contamination. Higher figures might well have been obtained in herbage as opposed to turf samples. This farm, however, particularly that part closest to the source, has in recent years been subjected to contamination with copper and zinc from a second factory. The effect of the zinc was such as to reduce the grazing very considerably and the copper appears to have acted as an antidote, for the cattle on the farm had symptoms along with the cattle on the others in 1948 before the copper process was commenced.

Scouring did not occur during the winter feeding months when contamination of hay and green food might still have been expected, but a considerable proportion of winter food, concentrates and roots would not be susceptible to contamination as would the herbage.

Recent work by Dick (1952) on sheep in Australia has shown that the effect of a high molybdenum intake on liver copper storage varies according to the nature of the diet. In subsequent work Dick (1953a) has shown that inorganic sulphate was the factor in the diet that was responsible for the variation in liver copper storage on high intakes of molybdenum, and from further experiments (1953b) he claims that molybdenum can only limit the storage of copper in the liver of sheep when adequate inorganic sulphate is also present in the diet. If the same principle applies with cattle, variations in diet may, through altering the sulphate content, be partly responsible for the variations in appearance of symptoms between the farms studied and for variations from one year to another.

The factory producing molybdenum alloys was concerned about the loss of valuable metal apart from any risk of agricultural damage, and in the autumn of 1952 fitted scrubbers to the flues. This may account for the absence of teart symptoms in 1953.

Summary

An account is given of an outbreak of a teart-like condition in cattle on four farms situated on Keuper Marl and Glacial Sands in Warwickshire. The farms are to the north and east of three aluminium alloy factories, one of which was using molybdenum. Herbage analyses were made to confirm that the source of molybdenum was aerial contamination. Copper estimations on bovine bloods yielded low figures; the cows showed a craving for copper sulphate, the administration of which allayed the symptoms. In the later period of observations symptoms were not observed on the most vulnerable farm due to high copper contamination of the grazing. An account of zinc poisoning of plant life in proximity to one of the factories, is also given.

Acknowledgments.—We gratefully acknowledge our debt to Mr. C. D. Rickaby, N.A.A.S., for the first analyses in 1948 which led to the further investigation, and for the other herbage analyses; to the Biochemistry Department, Veterinary Laboratory, Weybridge, who carried out the liver and blood analyses for copper; to Dr. R. L. Mitchell, The Department of Spectrochemistry, The Macaulay Institute, for the soil analyses in Table III, and to Mrs. M. Griffiths, N.A.A.S., for the copper analyses in Table IV

References

ACLAND, T. D. (1850). *J. Roy. Agric. Soc. Eng.* **11.** 755.
ALLCROFT, RUTH. (1952). *Vet. Rec.* **64.** 7.
CLARKE, A. (1855). *J. Bath & W. Eng. Soc.* (New series). **3.** 52.
CUNNINGHAM, I. J. (1950). "Copper Metabolism. A Symposium on Animal, Plant and Soil Relationships." Baltimore : Johns Hopkins Press. 1950. 258.
DICK, A. T., & BULL, L. B. (1945). *Aust. V. J.* **21.** 70.
———. (1952). *Ibid.* **28.** 30.
———. (1953a). *Ibid.* **29.** 18.
———. (1953b). *Ibid.* **29.** 233.
FERGUSON, W. S., LEWIS, A. H., & WATSON, S. J. (1938). *Nature, Lond.* **141.** 553.
———, ———, & ———. (1943). *J. Agric. Sci.* **33.** 44.
KNOWLES, F. (1945). *Agric. Progress.* **20.** 16.
LEWIS, A. H. (1943). *J. Agric. Sci.* **33.** 52.
MUIR, W. R. (1936). *Agric. Progress.* **13.** 53.
———. (1941). *V. J.* **97.** 400.

The Efficacy of Berenil against *T. congolense* in Zebu Cattle

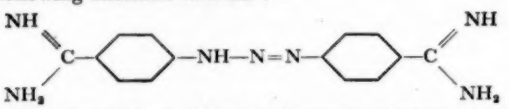
BY

A. H. MILNE, J. ROBSON and and T. LWEBANDIZA

Veterinary Research Laboratory, Mpwapwa, Tanganyika

Introduction

BERENIL is a diguanyl-diazoamino-benzine derivative supplied through the courtesy of Dr. F. Bauer, of Farbwerke Hoechstag, Frankfurt. It has the following chemical formula :—



and is supplied as a lactate-gluconate mixture, in the form of a yellow powder. A 5 per cent. solution is easily prepared by slightly heating sterile distilled water and shaking. The solution, which is clear and of a dark orange colour, should be freshly prepared before use as the manufacturers warn that in contact with air it remains stable for only a limited time.

Bauer (1954) working in Portuguese East Africa, found that in an experimental trial with more than 500 cattle, one injection of Berenil at a dosage rate of 2 or 3 mg. per kg. completely cured infections of *T. vivax*, *T. congolense* and *T. brucei*. It was accordingly decided to try the efficacy of the drug against *T. congolense* in Tanganyika Zebu cattle.

Methods

Twenty-five Zebu cattle of varying weights and ages were infected with a field strain of *T. congolense* (Strain Godegode II) which had been passed through goats to clear the blood of any Theilerial infection. Eight days later all the infected cattle showed positive blood slides and seven days after this 20 of the cattle were treated with Berenil using a 5 per cent. solution at a dosage rate of 2 mg. per kg. The other five cattle were left untreated as controls. Thick blood slides were examined three times a week for a period of 150 days and if an animal showed negative slides throughout this period it was considered cured.

On the 151st day after treatment the treated cattle, together with two controls, were infected with the same strain of trypanosomes, 8,000,000 to 10,000,000 trypanosomes being inoculated into each animal.

Van den Bergh tests were carried out weekly on all treated cattle throughout the duration of the experiment.

The experiment was started in April, 1954, and was completed in October. This is the period of the dry season which that year had been a particularly arduous one. Grazing from June onwards was extremely scarce but no extra food was fed to any of the experimental animals and they were therefore in very poor condition at the end of the experiment.

Results

Five of the treated animals received Berenil subcutaneously and 15 intramuscularly, and in neither group was any reaction to the injection noticed. Disappearance tests were carried out on all 20 treated animals and the results are given in Table I.

One animal (No. 121) was destroyed 10 days after treatment because it had been mutilated by a hyaena, but all the other treated animals survived until the end of the experiment. Of the five controls, one died 42 days after infection, another 56 days, the third 57 days, the fourth 62 days and the last 111 days after infection. All showed the typical symptoms and *post-mortem* features of the disease caused by *T. congolense* and all showed positive blood slides whenever examined up to the time of death.

TABLE I

SHOWING THE DISAPPEARANCE OF TRYPANOSOMES FROM BLOOD SMEARS AFTER TREATMENT WITH BERENIL

Animal number	Blood smears before treatment	5 hours	20 hours	24 hours	29 hours	44 hours	68 hours	92 hours	116 hours
7	Pos.	Pos.	Pos.	Pos.	Pos.	Neg.	Pos.	Neg.	Neg.
15	"	"	"	"	"	Pos. ?	" ?	"	"
72	"	"	"	Neg.	Neg.	"	"	"	"
104	"	"	"	Pos.	Pos.	"	"	"	"
113	"	"	"	Neg.	Neg.	Neg.	Neg.	"	"
114	"	"	"	"	"	"	"	"	"
121	"	"	Neg.	Pos.	"	"	"	"	"
187	"	"	Pos.	Neg.	"	"	"	"	"
200	"	"	"	"	"	"	"	"	"
258	"	"	"	"	"	"	"	"	"
262	"	"	"	Pos.	Pos.	"	"	"	"
263	"	"	"	Neg.	Neg.	"	"	Pos. ?	"
265	"	"	"	Pos.	"	"	"	Neg.	"
267	"	Neg.	Neg.	Neg.	"	"	"	"	"
278	"	Pos.	"	"	"	"	"	"	"
279	"	"	Pos.	"	"	"	"	"	"
291	"	"	"	"	"	"	Pos. ?	"	"
293	"	"	"	"	"	"	Neg.	"	"
296	"	"	"	"	"	"	"	"	"
300	"	"	"	"	"	"	"	"	"

Pos. represents blood slide containing whole trypanosomes.
Pos. ? " " " trypanosomes breaking up.
Neg. " " " no trypanosomes.

All the treated cattle showed negative blood slides throughout the period of the experiment and were considered cured. Van den Bergh tests carried out weekly on these animals were all negative.

After being reinfected on the 151st day after treatment, two cattle showed *T. congolense* in the blood after six days, and 16 others after eight days. The remaining animal showed no trypanosomes in its blood. Of the two controls, one showed trypanosomes in the blood on the sixth day after infection, and the other on the eighth day.

Conclusions

From the results obtained in this experiment it can be seen that, taking as a criterion of cure the absence of trypanosomes from the peripheral blood for a period of 150 days, Berenil in a dose of 2 mg. per kg. cured Zebu cattle experimentally infected with *T. congolense* when treated in the early stages.

At this dosage level Berenil appears to have no toxic effects.

The drug does not protect cattle when they are reinfected after 150 days.

Acknowledgments.—We are grateful to Mr. G. W. Walker, B.SC., A.R.I.C., for carrying out the Van den Bergh tests, and to Mr. Michael Nyenga, African Veterinary Assistant, for his help during the experiment. The Director of Veterinary Services has kindly given us permission to publish these results.

Reference

BAUER, F. I. (1954). Personal communication.

ARTIFICIAL INSEMINATION FOR PIGS

A service for the above is shortly to be started at the Dartington Hall Cattle Breeding Centre. The project will at first be on a limited scale and service from Large White boars will be offered to farmers in the area on the same principles as for cattle insemination. Being the first commercial service which has been offered for artificial insemination of pigs some caution will be exercised until the difficulties of technique and administration have been assessed and overcome. If the scheme proves workable then a full scale service will be developed, probably with service from Landrace boars.

After much research, a small A.I. station for pigs is to be started in Cambridge in the very near future. This will not be an experimental station, but a practical undertaking similar to the A.I. stations for cattle, though it will be at first on a comparatively modest scale. Our readers will recall the paper by Mr. T. Glover (*Vet. Rec.* **67.** 36), which described some of his work on this subject and indicated certain problems which still remained. Since that time, the main advance which has helped to make A.I. for pigs into a practical proposition has been in the use of glycine dilutor, which was developed by Dr. A. Roy and Mr. M. Bishop.

Mr. C. Polge has continued Glover's work, which was interrupted owing to illness—and we are hoping to publish a paper by him in the near future.

Hypomagnesaemia in Ewes

BY

H. L. POOK

Salisbury

Subject.

A flock of 280 in-lamb Border Leicester cross Suffolk ewes running on downland leys.

Flock and Pasture Management.

Each year 30 two-tooth ewes are added to this flock, so that at any time the flock consists of 30 two-tooth, 30 four-tooth, 30 six-tooth and the remainder full-mouth ewes.

In this particular outbreak the ram was turned out in mid-October and lambing commenced on March 13th, 1954.

Up to the time of lambing the sheep were running on a four-year-old ley consisting of ploughed-up downland sown with a mixture of: 16 lb. perennial rye grass, 4 lb. Italian rye grass, 4 lb. cocksfoot and 2 lb. S100 clover per acre.

This ley had been treated each year in January* at the rate of 3 cwt. per acre and in early spring with sulphate of ammonia at the rate of 2 cwt. per acre.

No concentrates were fed to the sheep at any time. After each ewe had lambed she was moved on to a first year ley made up of the same mixture as the older ley which had been dressed in the same way.

The lamb crop was heavy and both ewes and lambs were doing very well.

History.

On March 29 two ewes were found dead in the morning and three more the next morning. Advice was sought and hypomagnesaemia was suspected.

It was noticed that, at first, losses were occurring only amongst the two-tooth ewes which had been lambed for about 10 days.

The owner was acting as shepherd and he was now keeping a much closer watch on the sheep than previously. He discovered that a ewe could be quite normal at one routine visit and yet two hours later would be found down in convulsions and in a further two hours would be dead.

Before the outbreak was checked 11 ewes were lost of which seven were two-tooth, two were four-tooth and two were old ewes.

Diagnosis and Post-mortem *Examination.*

The ewes were in good condition and had plenty of milk and it appeared to be only ewes with twin lambs which were affected.

An attempt was made to get blood samples from ewes which were in convulsions but it was never possible to obtain them until the animal was on the point of death and in each case the laboratory reported that the samples were unsuitable for chemical examination.

It was therefore decided to obtain samples from a group of two-tooth ewes which had been lambed just over a week.

---

* Fison's Mixture No. 31.

Four samples were taken on April 6th with the following results:—

	1	2	3	4
Ca mg. per c.c. serum ...	9.0	9.3	9.9	10.1
Mg mg. per c.c. serum ...	1.2	1.3	1.1	2.3
Acetone		normal		

Note: Low Mg levels in samples 1, 2 and 3.

Post-mortem examination showed the carcases to be in very good condition. There was petechiation of the myocardium in a few of the cases. No other abnormality was detected.

Treatment.

In an attempt to raise the blood magnesium levels proprietary mineral licks with a high Mg content were made available but, although the ewes were keen to make use of them, losses still occurred.

The feeding of calcined magnesite at the rate of 2 oz. per head per day was next tried. This was fed in open troughs. The sheep were not used to this kind of feeding and even when the sheep were confined at night and the magnesite was made available to them, mixed with bruised oats, they were not taking sufficient Mg and losses were still occurring.

One ewe seen to go down in convulsions was injected subcutaneously with a proprietary magnesium preparation showed some response and recovered after being given a second injection 12 hours later.

It was then decided to put the ewes back on to the four-year-old ley. Magnesite was still kept available for them but they never really took to it. From that time there were no further losses.

Discussion

The condition appears to be similar in its onset and course to that occurring in beef cattle running under similar circumstances.

Preventative treatment by means of which the magnesium intake is kept up during the duration of pregnancy and for a short time afterwards seems to be the best line to adopt. This was proved in the neighbouring flock where similar trouble was experienced in the previous year. Mineral licks, with added magnesium, were made available from one month after the ram was put out to one month after the last lambing. As a result there were no losses from hypomagnesaemia and the owner has reported one of his finest crops of lambs ever.

Once the condition appears it is essential to get the sheep back on to an old ley or on to permanent pasture. This is because it is very difficult to get the sheep to take up sufficient magnesium in an artificial way to check the appearance of fresh cases.

It is interesting to consider when a particular ley becomes safe as regards this condition. Thus in this outbreak whereas the four-year-old ley would appear to be safe the first-year ley is not. Somewhere between these two there is a safety line.

One logical solution would seem to be the application of a magnesium-rich fertiliser when the ley is first put down.

Acknowledgment.

Thanks are due to the Veterinary Investigation Officer's staff at Langford, Bristol, who made the examination of the blood samples.

Current Literature

DIGEST

Urinary calculi in the dog

Fifty-two case histories of urinary calculi representing 25 bitches and 27 dogs, are described in a paper by Brodey. Predominantly phosphate calculi were found in 42 animals, and uric acid calculi in the remaining 10, all of which were dogs, and included four Dalmatians. Multiple calculi occurred in over 90 per cent. of cases of cystic calculi. Urine samples from 47 affected animals were collected for bacteriological examination by aspiration from the bladder during the operation of cystotomy. Bacterial infection was demonstrated in 90 per cent. of cases of phosphate calculi, *Staph. aureus* being the predominant organism. Bladder infection was detected in only one out of the eight cases of uric acid calculi examined.

In a discussion on the aetiology of urinary calculi, Brodey noted phosphate calculi precipitate in alkaline urine only, and acidification of the urine is therefore indicated; for this enteric-coated pills of ammonium chloride were preferred to sodium acid phosphate. The chronic retention of urine, which is a common condition in household pets, was considered to predispose to the formation of cystic calculi. Calculi in the male required prompt surgical treatment because of the danger of urethral obstruction. In cases of recurrent urinary calculi a permanent fistula immediately behind the penile bone was recommended. In this procedure, the urethral mucosa is sutured to the surrounding skin edges, so that the calculi can pass through the fistula, and blockage of the urethra is thereby reduced. Other forms of treatment, which were recommended, were the elimination of bladder infection by antibiotics, the administration of vitamin A., and an alumina carbonate gel, which reduces the absorption of phosphorus from the alimentary tract. The maintenance of a high fluid intake, with low mineral diet, is also suggested, together with the exclusion of milk, whole wheat, fish, and bone meal.

Urinary calculi in the cat

The subject of cystic calculi in the cat was reviewed by Lumb. He considers this condition is one of the most serious problems in cat practice, although confined to the male, or male castrate. The calculi were found to consist of magnesium ammonium phosphate. Affected animals were not usually presented for treatment until urethral obstruction had occurred. Diagnosis was confirmed by palpation of a distended bladder, often with the presence of sabulous material in the urethral orifice, and a protruded penis. The relief of the blockage can be achieved by irrigation of the urethra using a blunt pointed hypodermic needle, attached to a syringe filled with sterile saline. Alternative methods for intractable cases include aspiration of the bladder, with subsequent injection into the bladder of sterile mineral oil, or urethrotomy above the penile bone. Other suggested therapeutic methods are the administration

of antispasmodics, antibiotics, vitamin A., and ammonium chloride. The use of testosterone, or oestrone-testosterone is also reported to be of value, and reference is made to the use, in man, of injections with hyaluronidase, which increases the colloid content of the urine, and reduces its turbidity and sediment.

Aureomycin and retained placenta in the cow

A tablet containing 500 mg. of crystalline aureomycin was inserted into the uterus of every cow in a dairy herd which had not expelled its placenta within 12 hours of calving. Such animals were treated within 12 to 24 hours *post-partum*. No attempt was made to remove the placental membranes by traction. In 16 animals an aureomycin tablet was inserted at intervals of 24 hours, until the placentae were expelled, while 15 cows were treated every 48 hours. The average period that the placentae were retained was five days, and no difference was observed between the two groups of animals. No ill effects on the subsequent reproductive efficiency of these animals was observed. (Easterbrooks & Plastridge.)

The reduction of elbow dislocations in the dog

A method for the reduction of elbow dislocations in the dog is described by Leighton. After clipping the hair, an incision was made to expose the lateral ligament from its origin on the condyle of the humerus to its insertion on the head of the radius. This ligament was then split longitudinally to expose the joint cavity. A pair of closed, curved, blunt-ended scissors was introduced into the joint with the concave surface facing the articular surface of the radius. The forearm of the dog was then flexed, and the end of the scissors was applied to the lower extremity of the humerus. The reduction of the dislocation was achieved by rotating the scissors to bring the concavity towards the humerus. In this way the end of the scissors acted as a lever, and the curve of the scissors acted as a skid to bring the two bones together.

Enzyme treatment for wounds

A new treatment for suppurating wounds is reported by Parker, who used enzymes to render purulent exudates more liquid. The enzymes were extracted from culture media of haemolytic streptococci, and named streptokinase and streptodornase. The streptokinase is described as activating the lysis of fibrin, while the streptodornase causes liquefaction of the purulent exudates.

The effect of these agents was to reduce the viscosity of pus so that its drainage or aspiration was made easier. The enzymes were prepared as a dry powder contained in ampoules. For application the enzymes were dissolved in water and instilled into the affected area, or carried on gauze or tampons. The combination of streptokinase and streptodornase in this form was used effectively on eight cases, in small animals, which included infected puncture wounds, abscesses, and bone necrosis.

Hydrocortisone and Neomycin ointment

Hydrocortisone, in an ointment base, is being used for the treatment of certain skin affections in man, because of its anti-inflammatory effect. Some uses of this preparation in small-animal practice are described by Schultz.

Hydrocortisone does not inhibit or destroy pathogenic organisms, and may encourage their growth by its depressant effect upon the inflammatory reaction. An antibacterial agent is therefore indicated when hydrocortisone is applied to the skin and the antibiotic neomycin was selected for this purpose. There are reports, however, that the bacteriostatic effect of certain antibiotics is lowered in the presence of cortisone, and it is assumed, but not specifically stated, that neomycin does not come into this category. The combination of hydrocortisone and neomycin was used on three cases of otitis externa, three cases of dermatitis, and six cases of wounding. The ointment was applied daily for periods ranging from 2 to 14 days. The results were described as "spectacular," or "excellent," in 11 cases, but the 12th only achieved the classification of "good."

D. W. J.

References

BRODEY, R. S. (1955). *J.A.V.M.A.* **126** (934). 1-9.

EASTERBROOKS, H. L., & PLASTRIDGE, W. N. (1955). *Vet. Med.* **50** (1). 21-22.

LEIGHTON, R. L. (1955). *J.A.V.M.A.* **126** (934). 17-19.

LUMB, W. Y. (1955). *Vet. Med.* **50** (1). 26-30.

PARKER, S. H. (1955). *N. Amer. Vet.* **36** (1). 49-50.

SCHULTZ, H. L. (1955). *Vet. Med.* **50** (1). 32-33.

ABSTRACT

Treatment of Canine Distemper with SRH intravenously. PLEUGER, C. A. *J. Am. vet. med Assoc.* (1954, Aug.). **125.** No. 929. 111-3.

The synthetic product SRH (sodium-sulph-ricin-hydrazine) is considered of value in the treatment of canine distemper accompanied by secondary infections of varying severity and including those of a nervous character.

100 mg. SRH in 1 c.c. solution per 5 to 6 lb. bodyweight are administered very slowly. In the great majority of cases so treated, temperature falls appreciably in eight hours, failing which the dose is repeated. Death followed rapid injection into two dogs weighing only 5 to 7 lb. and a number of animals with unusually high temperatures showed evidence of shock. The product was not tried on advanced neglected cases.

A detailed table is given of 10 dogs so treated, and would indicate that SRH is also of value in the treatment of peritonitis and of mixed type infections. Suitable adjuvant treatment was commenced at the time of injection, and the writer claims that the use of barbiturates with SRH successfully controlled the spasms of epileptiform distemper with convulsions.

J. P.

News and Comment

MEETING OF THE EUROPEAN FOOT-AND-MOUTH DISEASE COMMISSION

Two projects connected with the technical aspects of foot-and-mouth disease control were specially selected by the second meeting of the Commission, in Rome, as points of co-operation with OEEC. The first of these is the holding of a seminar later this year, on the typing and cultivation of foot-and-mouth disease virus. The OEEC observer present confirmed that his organisation would be prepared to sponsor this seminar in Amsterdam.

The second project concerns research on the duration of immunity of vaccinated cattle, with especial reference to the use of trivalent vaccines. In this work, which would perhaps require material support from member countries, the OEEC representative also considered his organisation might be able to collaborate.

Other matters discussed included the collection and dissemination of information on the foot-and-mouth situation in countries outside Europe; the need for more complete arrangements for typing virus; the question of supplies of vaccine for countries where this method of control is practised; and the suggested International Sanitary Convention for the Prevention of Foot-and-Mouth Disease, currently under discussion in Paris. With regard to this last point, the members of the Commission considered that it would have a better prospect of success if strong regional organisations were first established, especially in view of the very different levels of veterinary services and control organisations in the countries which might become members of a world wide convention. To this end, it was once more strongly urged that *all* European countries which had not yet done so should become members of the European Commission, so that a united effort could be made to safeguard all Europe from the disease.

THE REGISTER OF VETERINARY SURGEONS

The names of the following gentlemen have been restored to the Register of Veterinary Surgeons:—

Barron, William Knight, 22, Poltimore Road, Guildford, Surrey; Dixon, James Atkinson, 37, Saunders Street, Southport, Lancs; Farrelly, Brendan Thomas, 22, Zion Road, Rathgar, Dublin; Galloway, James Douglas, c/o 55, Shakespeare Road, Bedford.

MINISTRY OF AGRICULTURE VETERINARY FIELD STAFF

Mr. G. Durrant, B.V.SC., M.R.C.V.S., Superintending Veterinary Officer, Edinburgh, retired on March 19th, 1955.

Mr. B. A. Claxton, M.R.C.V.S., Divisional Veterinary Officer at Head Office has been promoted to Superintending Veterinary Officer.

Mr. James Reid, M.R.C.V.S., D.V.S.M., Superintending Veterinary Officer, has been transferred from Head Office to Edinburgh.

THE UNIVERSITY OF LIVERPOOL B.V.Sc. THIRD EXAMINATION, MARCH, 1955

Part II. Veterinary Pathology (including Microbiology and Parasitology).

Barraclough, A. B.; Birks, Margaret; Butler, Eileen J. M.; Coles, B. H.; Doran, G. P.; Dungworth, D. L.; Dunwell, R. S.; Etheridge, M. F. N.; Evans, D. J.; Gibbons, C. W.; Langman, B. A. G.; Moss, B.; Roberts, R. G.; Schwarz, G.; Shepherd, M. J. W.; Sims, F. W.; Stevenson, D. E.; Struthers, Edith A.; Stuart, J. C.; Ward, R. K.; Watson, S. N.; Williams, Rosemary J.

Part III. Animal Husbandry.

Barraclough, A. B.; Birks, Margaret; Coles, B. H.; Doran, G. P.; Dungworth, D. L. (with Distinction); Etheridge, M. F. N.; Evans, D. J.; Gibbons, C. W.; Langman, B. A. G.; Lowe, A. D.; Moss, B.; Roberts, R. G.; Schwarz, G.; Shepherd, M. J. W.; Sims, F. W.; Stevenson, D. E.; Struthers, Edith A.; Stuart, J. C.; Ward, R. K.; Watson, S. N.; Williams, Rosemary, J.

AILMENTS OF BIRDS, RABBITS, GOLDFISH, ETC.

There appears to be an increasing demand for veterinary assistance in dealing with the ailments of less usual domestic pets such as birds, rabbits, goldfish, etc. It would be helpful if readers who are interested, or who have specialised knowledge, would kindly notify the General Secretary, British Veterinary Association, 7, Mansfield Street, Portland Place, London, W.1, and at the same time state whether they would be prepared to give advice on specific problems to veterinary surgeons who may require their assistance.

A list of names will then be kept at B.V.A. headquarters, and those wishing for advice are invited to apply to the Association.

PERSONAL

Births

MILLER.—On February 12th, 1955, to Jean (*née* Greig, M.R.C.V.S.) and Alexander M. H. Miller, B.SC., of 10, Clermiston Road North, Barnton, Edinburgh, a son.

TWEEDALE.—On March 29th, 1955, to Ann Chalmers (*née* Currie), wife of Lindsay Tweedale, M.R.C.V.S., of Springfield, Sandgate Hill, Folkestone, Kent, a daughter, Jennifer.

Marriage

SHARRATT—HOGG.—On March 26th, 1955, at Christchurch, Eston, by the Rev. P. N. Wansey, Robert Keith Sharratt, B.SC., M.R.C.V.S., son of the late Walter Sharratt and Mrs. V. Sharratt, of Appleton, Cheshire, to Margaret Elspeth Hogg, daughter of Mr. and Mrs. D. B. Hogg, of Eston, N. Yorkshire.

COMING EVENTS

April

14th (Thurs.). Annual All-day Meeting of the Central Division, B.V.A., at the Royal Veterinary College, Camden Town, N.W.1, 11 a.m.

15th (Fri.). General Meeting of the Midland Counties Division, B.V.A., at the Star Hotel, Worcester, 2.30 p.m.

Fifth Annual General Meeting of the South-East Midlands Division, B.V.A., at Franklin's Garden Hotel, Northampton, 7 p.m.

20th (Wed.). Meeting of the Royal Society of Medicine, Section of Comparative Medicine, at the Society's house, 5 p.m.

21st (Thurs.). General Meeting of the Herts & Beds Division, B.V.A., at 70, Holywell Hill, St. Albans, 7.30 p.m.

22nd (Fri.). General Meeting of the Mid-West Division, B.V.A., at the Berkeley Café, Clifton, 2.30 p.m.

23rd & 24th (Sat. & Sun.). Annual Reunion Weekend for 1952 R.V.C. graduates and contemporaries. Dinner at " Ye Miller of Mansfield " Hotel, Goring, Saturday, 7.30 p.m.

28th (Thurs.). Meeting of the Essex Division, B.V.A., at the Essex Institute of Agriculture, Writtle, 7.30 p.m.

30th (Sat.). Annual General Meeting of the Association of State Veterinary Officers in the Auditorium of the Wellcome Research Institute, 183-193, Euston Road, N.W.1, 1.30 pm. Annual Dinner at the Criterion Restaurant, Piccadilly, W.1, 7 p.m.

May

3rd (Tues.). Afternoon Meeting of the Eastern Counties Division, B.V.A., at Colchester.

6th (Fri.). Royal Veterinary College 163rd Annual Ball at the Hyde Park Hotel.

11th (Wed.). Evening Meeting of the Eastern Counties Division, B.V.A., at Ipswich.

Meeting of the Royal Veterinary College Medical Association at Streatley House, Berks, 2 p.m.

12th (Thurs.). R.C.V.S. Dinner, Dorchester Hotel. Further details will be published next week.

14th (Sat.). Annual Sports Day of the Royal Veterinary College to be held at Streatley, 2 p.m.

31st (Fri.). Annual Dinner-Dance of the Chiron Club in the Royal Hotel, Bristol, 7 p.m.

June

10th (Fri.). Annual Dinner of the R.A.V.C. Officers' Club, at Grosvenor House, Park Lane, London.

September

4th to 10th. 73rd Annual General Meeting and Congress of the British Veterinary Association at Belfast.

R.C.V.S. EXAMINATIONS

May 6th, Friday.—Pharmacology, etc., Examination (Revised Syllabus). Written Examination.

May 9th, Monday.—Pharmacology, etc., Examination (Revised Syllabus). Oral and Practicals (London and Dublin).

May 12th, Thursday.—Animal Management Examination at Dublin.

May 12th, Thursday.—Entries for D.V.S.M., Examination due.

June 9th, Thursday.—D.V.S.M., Written Examinations commence at Edinburgh.

June 13th, Monday.—D.V.S.M. Oral and Practicals commence.

June 23rd, Thursday.—M.R.C.V.S., Written Examinations.

June 24th, Friday.—M.R.C.V.S., Written Examinations.

June 27th, Monday.—M.R.C.V.S., Practical and Orals commence (Panels "A" and "B").

ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Derby. Hollies Farm, Atlow, Ashbourne (Mar. 29).

Dorset. Lynch Farm, Kingston, Corfe Castle, Wareham (Mar. 30); Arne Farm, Wareham (Mar. 31).

Durham. Westfoldgarth, Woodland, Bishop Auckland (Mar. 30).

Hants. Buona Vista Farm, Lymore Lane, Milford-on-Sea (Mar. 31).

Leics. Foston Lodge, Countesthorpe (Mar. 30).

Midlothian. Gilmerton Dairy, Gilmerton, Edinburgh (Mar. 29).

Warwicks. Dorsington Manor Farm, Stratford-on-Avon (Mar. 31).

Yorks. Hill Top Farm, Wandsacre, Oughtibridge, Sheffield (Mar. 29); No. 2, Smallholding, Sproatley Road, Preston, Hull; School Farm, Crathorne, Yarm-on-Tees (Mar. 30).

Fowl Pest

Cambs. 15, Church Street, March (Mar. 29).

Herts. 7, Mount Pleasant, Bricketwood, Garston, Watford (Mar. 31).

Kent. 8, Council Houses, Crocken Hill, Egerton, Ashford; Link Farm, Egerton (Mar. 30).

Sussex. Ivybank, Ivyhouse Lane, Ore, Hastings; Maplehurst View Piggeries, Westfield Lane, Baldslow, St. Leonards-on-Sea (Mar. 29); Pond Cottage, Henley Down, Catsfield, Battle (Mar. 30).

Swine Fever

Ayr. Craigford, Straiton, Maybole (Mar. 29).

Ches. Downs Farm, Styal, Wilmslow (Mar. 31); Wood Farm, Little Stanney, Chester (Apr. 1).

Denbighs. Trevor House Farm, Trevor, Wrexham (Apr. 4).

Essex. Hall Farm, South Hanningfield (Mar. 29); 11, Mill Road, Mayland, Chelmsford (Apr. 1); Webster's Premises, Rushgreen, Clacton-on-Sea (Apr. 2); 15, Court End, Foulness Island, Southend-on-Sea; Camoys, London Road, Braintree (Apr. 4).

Gloucs. Upper Folly, Paxford, Chipping Campden (Mar. 29).

Lancs. Fowler Fold Farm, Feniscowles, Livesey, Blackburn; Spring Mount Farm, Hilldale, Parbold, Wigan (Mar. 30); Little Bannister Hey Farm, Claughton on Brock, Garstang, Preston (Mar. 31); Cousins Farm, Cousins Lane, Rufford, Ormskirk; Home Farm, Hulton Park, Westhoughton, Bolton; Withins Hall Farm, Woodhouses, Failsworth, Manchester (Apr. 1); 26, Green End Lane, St. Helens; Plane Tree Farm, Sowerby Lane, Inskip with Sowerby, Preston (Apr. 2); Edenfield Farm, Goosnargh, Preston (Apr. 4).

Norfolk. Dole Farm, Stratton Strawless, Norwich (Apr. 2); Kia Mena, Downham Road, Watlington, King's Lynn; Street Farm, Erpingham (Apr. 4).

Notts. Moor Farm, Thorney, Newark (Mar. 29).

Renfrews. 37, King Street, Paisley (Apr. 1); Auchmead Farm, Greenoch (Apr. 4).

Salop. Little Whiston Farm, Albrighton, Wolverhampton; Dudleston Hall, Ellesmere (Mar. 30); Red Lion Inn, Market Drayton (Apr. 1).

Staffs. Fulford Hall Farm, Fulford, Stoke-on-Trent (Mar. 29); 155, Oversetts Road, New Hall, Burton-on-Trent (Apr. 4).

Suffolk. Courtlands, Rushbrooke Lane, Bury St. Edmunds (Apr. 4).

Warwicks. "Lyndale," Park Lane, Snitterfield, Stratford-on-Avon (Mar. 29).

Yorks. Elder Farm, Willitoft, Howden (Apr. 1); Mill Farm, Hotham (Apr. 4).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

PUBLIC RELATIONS AND THE R.C.V.S.

Sir,—Shortly after my arrival in the U.S.A. some five years ago, I was invited to address a meeting of veterinarians. (You will note I do not refer to these gentlemen as veterinary surgeons, for this title appears, in the eyes of the R.C.V.S., to be restricted only to members of the R.C.V.S., despite the fact that graduates of veterinary schools in some other countries also refer to their graduates by that title.) The subject on which I was asked to speak was "The Veterinary Profession in Great Britain." Part of the talk was devoted to the code of ethics. I could not help but be amazed at the response of my audience when I mentioned that it was "illegal" for any member to announce in the public Press that he was about to set up a practice. (This was apparently allowed in the not-so-far distant days when Dr. Bullock's book held pride of place as the veterinarians' guide to professional conduct.) One cannot help but wonder just how a young graduate is going to become known, for it is unlikely that he will be able to set up his plate along a busy thoroughfare. More likely his premises will be in a locality where rent and rates are lower. Can anyone say why this rule was introduced?

In the editorial of THE VETERINARY RECORD, dated February 5th, 1955, entitled "Public Relations," reference is made to scrupulously maintaining the anonymity of any member who performs some notable piece of work. I would ask, "why maintain the anonymity?" In my home town I well remember many years ago two different veterinarians who, on different occasions, each gained publicity for the profession by his professional handling of disease in zoo animals. They did not ask for *personal* publicity but they got it. These men were not penalised, but I gather they would have been if the incidents had happened yesterday. The discoverer of penicillin, though not a veterinarian, could never have hidden behind a cloak of anonymity. Why should he? The *Guide to Professional Conduct*, 1951, page 11, says: "The only legitimate method of gaining professional reputation is by strict ethical conduct and the *proficient and skilful exercise of his profession.*" (Writer's emphasis.) Does not a notable piece of work quoted in the national Press justify its being termed "legitimate advertising?"

What of the man who wishes to confine his practice to canine or equine work? It is unlawful for him to describe himself as a canine surgeon. Why? it does not necessarily infer that he is holding himself out to be a specialist in that field. Might I suggest that when the *Guide* is revised, the person concerned be permitted to state on his plate, "Practice restricted to equines, canines," or something along that line, or would that still be considered unprofessional conduct?

With reference to Titles and Descriptions, a member of the R.C.V.S. is not permitted on his professional stationery to draw attention to any appointments which he, as a practitioner, may hold. Yet he apparently can list all these additional appointments on any book, professional or otherwise, which he may choose to write and have published. Why the difference? Such books are read by the lay public as well as by professional men.

A study of the various supplements to THE VETERINARY RECORD seems to suggest that either the present code is too strict or that the ethical standards of the profession are not all that are desired. To my mind the code is too strict, otherwise why would so many members have to obtain the advice of Council R.C.V.S. before proceeding with their contemplated plans? Correspondence in THE VETERINARY RECORD on the subject "A Legitimate Grievance" suggests that all is not well with the public relations of the veterinary profession in Great Britain. Dare I suggest, since I can speak impartially, not being engaged in practice in Great Britain, that perhaps the present ethical code is in need of revision too? It should not be interpreted that I am trying to uphold the American code of ethics while condemning the British code, for to my mind the ethical code should be more stringent on this side of the Atlantic.

Finally, why should a member of the R.C.V.S. residing overseas be obliged to pay an annual fee to the R.C.V.S. in order to retain his hard-won letters? For the M.R.C.V.S. residing overseas this fee is in no sense a payment for a licence to practice. In most cases, depending on the State or province in which he works, he pays a fee to permit him to practice in the Province or State concerned, but he does not pay any fee to retain his degree. What benefits does such an overseas member have from the R.C.V.S. to justify the collection of that fee? One member of our graduating class here is under the impression that he would be entitled to use the letters M.R.C.V.S. after his name (in addition to his D.V.M.) by virtue of having his name entered on the Commonwealth register, when he arrives in Britain. Is this so? Also, what of the future crop of university graduates in Britain? Will they be permitted to use the letters M.R.C.V.S. in addition to their university degree?

These seem controversial issues but to one who has been exposed to ethical codes in more than one country, the discrepancies are obvious. This letter, then, is an attempt to gain constructive criticism and bring forward viewpoints, not only of the older graduates, but of the younger men who seem to suffer most by virtue of our strict ethical code.

Yours faithfully,

F. J. MILNE,
Professor,
Department of Medicine & Surgery,
Ontario Veterinary College,
Guelph, Canada.

March 22nd, 1955.

PIG OEDEMA

Sir,—It may be of general interest to place on record the observations made over several years' careful study of pigs affected with this troublesome disease under a variety of managerial and feeding conditions. The conclusions given are purely tentative and are offered merely for consideration by others.

In almost all outbreaks the outstanding feature seems to be a sudden cessation of liveweight gain in pigs of susceptible age. Usually such pigs have gained weight satisfactorily until a sudden environmental change occurs, whether this be change of food or method of feeding, or alteration in surroundings through removal of the pigs. Those pigs in a pen which have not been gaining weight as rapidly as their fellows are less readily affected. It would appear that the products of digestion in excess of maintenance requirements, which might have been utilised for weight gain, set up instead a toxic condition in the body. Bearing this hypothesis in mind it is easy to understand how the condition can be alleviated by a temporary reduction of the ration to maintenance level, and how benefit can be obtained by the use of anything which assists elimination of the excess products of digestion, *e.g.*, the use of drugs which stimulate the kidneys and/or liver. Improvement has been obtained with a number of such drugs, although Epsom salts still remain outstanding in this respect.

Some people have attributed susceptibility to pig oedema to genetic factors. In this they may be right, since the ability to utilise food efficiently is itself an hereditary factor and some lines of breeding might thus be more susceptible. Observations suggest that susceptibility is linked with rate of daily gain. It has been noted that pigs will gain weight for a considerable time after a ration has been markedly reduced, either quantitively, or qualitatively. For this reason, when a sudden change in management is anticipated, it may be wiser to reduce the food intake a week or so before the change takes place—rather than to wait until the change has been made. In other words, the aim should be to keep the pigs at their existing bodyweight and not to feed for liveweight gain until the change has been safely accomplished. Of course this is not possible with purchased pigs but it is a practicable proposition for breeders who move their pigs from one set of buildings to another, or who wish to anticipate a change of feeding, or management. I would repeat that it does seem dangerous to feed for liveweight gain when this is likely to be arrested by environmental change.

The encouraging results obtained with vitamin B_1, reported by Austvoll in Norway, may have been due to the fact that this vitamin helped to nullify the nervous impact induced by such circumstances.

Yours faithfully,

A. L. WALTHER.

Crosfields & Calthrop Ltd.,
Vauxhall Road,
Liverpool, 5.

March 25th, 1955.

OLDEST COW?

Sir,—Having this week met a venerable old lady of the bovine world I am interested to know whether any reader can recall a cow having a longer record.

This black and white cross Hereford is at least 35 years old, has had 28 calves, the last one a bouncing bull only four years ago, and was milking until two years ago. As a pensioner she is now being kept for sentimental reasons.

Although she suffers from rheumatism in one hip and is in low condition, her senses of sight, smell, and hearing are excellent, and she looks as if she intends doing full justice to this summer's grazing.

Incidentally, the occasion of our meeting was simply a routine tuberculin test which, needless to say, she passed with flying colours.

Yours faithfully,

K. G. PITMAN.

11, Haven Road,
Haverfordwest,
Pembs.

March 31st, 1955.

LUNGWORMS IN PIGS: SPECIMENS INVITED

Sir,—In a recent survey we have found that about one-fifth of the bacon pigs in a wide area of England and Wales harbour lungworms. The infections are usually light and almost all the parasites are confined to rather inconspicuous lesions (pale lobular areas of emphysema and greyish nodules 2 to 5 mm. in diameter) near the inferior border of the diaphragmatic lobes. The lesions are easily missed, especially as they are so unlike the gross pneumonic lesions which are so common in the apical, cardiac and intermediate lobes. It may be that these small infections in bacon pigs do little harm.

The localisation of almost all the lungworms in adult pigs to the caudal lobe, mainly its extreme caudal tip, is odd because the worms are considered to reach the lungs by the blood stream. We have obtained some evidence to suggest that infections found in bacon pigs may represent a residue of what, in the young pig, was a heavier infection distributed throughout the whole lung. In pigs of about weaning age we have found lungworms in all lung lobes, including quite large numbers in the anterior and cardiac lobes, embedded in pneumonic areas. It is possible that in young pigs lungworms may be of considerable importance, especially since the large numbers of eggs liberated from them provoke a violent inflammatory reaction in the lung tissue.

Nearly one half of farm consignments of bacon pigs contained one or more animals with lungworms, which means that at least half of the farms in the areas where the survey was carried out are infected. On infected farms we have found no difficulty in finding larvae in earthworms, the intermediate host, or eggs in the faeces of pigs of all ages. Infection is probably most often acquired when the piglets are out with the sow before being weaned. After pigs come into fattening houses they are very unlikely to pick up infected earthworms.

Pigs begin to cough about two weeks after eating infected earthworms and coughing is most marked during the next six weeks, which under natural conditions would probably be the six weeks before weaning. In the presence of the gross lesions of virus pneumonia or changes caused by other micro-organisms it is our experience that lungworms are often overlooked.

Lungworm eggs are usually found in fairly small numbers, *e.g.*, 20 to 200 e.p.g. in pigs over weaning weight. Saturated salt solution floats only a small proportion of them: saturated magnesium sulphate is much better and will reveal very low counts, *e.g.*, 0.5 to 5 e.p.g.

This information is given so that practitioners may take an interest in lungworms and look out for them in animals of all ages. We are particularly interested in infections in young pigs and will gladly examine lungs, faeces samples or earthworms which practitioners send to this laboratory. We should like complete lungs so that the number of lungworms and their distribution, and the nature and extent of the lesions they produce can be studied. A sample of faeces or rectal contents of the affected pig should also be sent, together with faeces samples from other pigs on the premises (samples from individual pigs are best but mixed samples from a litter are better than no sample). Earthworms can also be submitted (about 20 in a glass jar) and will be examined for infective larvae in the crop and lower part of the oesophagus. Please send the history and details of the samples and we will see that a report on the parasites, eggs and larvae is sent promptly.

In this way useful information will be obtained which will supplement that obtainable from experimental infection. Moreover, practitioners will be able to make up their own minds as to the possible importance of lungworms under widely different conditions of management.

Faeces can be sent quite simply—a matchbox filled to the top will do well. The lungs should be wrapped in plenty of absorbent material (tow, cotton wool, newspaper) so that the parcel does not leak. The parasites travel well, so a day's delay in the post will not seriously interfere with their recognition.

We shall be very grateful for material or information on the subject from veterinary surgeons in all areas of the country.

Yours faithfully,

E. G. WHITE,

Department of Veterinary Preventive Medicine,
University of Liverpool,
Veterinary Field Station, "Leahurst,"
Neston, Wirral, Cheshire.

March 28th, 1955.

RABIES IN GERMANY

Sir,—Your annotation of January 1st mentions reasons why the vaccination campaigns applied successfully in four specified countries are not applicable to conditions in Western Germany. Since the Malayan campaign is one of those cited, and since it would appear that at least one reason adduced for non-employment of similar methods in Germany is false, you will, perhaps, permit me to comment.

It is doubtful whether full, critical, and unbiased consideration has been given to the rôle that mass vaccination of the dog population can play in a country faced with a serious rabies epizootic. Six reasons are given why vaccination of dogs in Germany has been rejected. They are:—

1. *That wild animals are chiefly affected.*—This of itself is not an argument against the vaccination of dogs, or, for that matter, of cats or cattle, all of which can be successfully immunised. There is no evidence that in Germany the infection in wild animals constitutes a serious threat to man: it is probable that infection in human beings would be more likely to result from the bites of dogs or cats than from those of foxes, badgers, deer, wild boars, cattle, or squirrels. If, then, the vaccination of dogs and cats can very largely prevent the transmission

of the disease to man it is not immediately obvious why vaccination has been rejected as a control measure.

2. *That cats are considered more dangerous than dogs.*—The cat is not usually regarded as an important vector of the disease. Since, however, cats can be effectively immunised against rabies with chicken-embryo-vaccine (Flury strain), it is curious that their vaccination does not seem to have been considered.

3. *That police measures have been successful in the past in controlling infection in dogs.*—It is apparent from the references cited in your annotation that police measures are no longer as reliable or as adequate in the particular circumstances of the moment as they are reported to have been in the past. I have had some experience of the seeming reluctance of certain Continental veterinary authorities to accept the vaccination of dogs as the powerful prophylactic weapon that it has proved to be. Whilst the vaccination of dogs, even using the more modern vaccines, is not necessarily the main feature in any rabies control programme, there is increasing evidence that, when rigidly applied, it can succeed where conventional police sanitary measures have failed. To reject the vaccination of dogs as a control measure in a country seriously infected with disease is hardly consistent with the resolution adopted in the 22nd session (1954) of the committee of the Office International des Epizooties, on which the German authorities were represented. The resolution states that in a seriously infected country strict police sanitary measures should be applied together, where necessary, with the preventive vaccination of all dogs aged three or more months by means of an officially controlled vaccine of proved innocuity and antigenicity.

4. *That vaccinated dogs must still be controlled, because their saliva is infectious, even though they are protected against clinical development of the disease.*—This is a most remarkable statement and one, I suggest, that should be viewed with the greatest reserve. It implies that a carrier state in dogs is induced by vaccination and, apparently, on a general scale—a finding that is, in my view, quite new. Zunker states:—

"Il y a assez de rapports à notre disposition pour prouver que les chiens vaccinés peuvent contracter la rage malgré la vaccination avec du virus fixe et qui'ils peuvent propager la maladie. Ils ne l'ont pas fait parce qu'ils sont tombés malades au *stadium prodromorum* et non pas au *stadium irritationis* et ainsi la malade a été difficilement décelable. La salive de tels animaux a été examinée et trouvée infectieuse."

This is a somewhat different state of affairs from that quoted in your annotation. It is not unlikely—indeed, it is highly probable—that such animals were vaccinated when in the incubative stage of the disease: this is a not unusual finding in any vaccination campaign although it may be less likely to occur with chicken-embryo vaccine (Flury strain) than with a vaccine of the Semple type. Zunker's statement cannot be accepted as a condemnation of vaccination: there is too much evidence to the contrary.

5. *That the public would be less likely to co-operate in other control measures if dogs were vaccinated.*—This must remain a matter of opinion. It was certainly not the case in the 1952-54 control campaign in Malaya. The purpose of mass vaccination was, prior to this campaign, explained through every possible publicity medium, and the reasons for its being made compulsory were made abundantly clear. Public co-operation was most gratifying. A total of over 115,000 dogs was vaccinated in the whole of the Federation of Malaya during 1954, representing not less than 85 per cent. of the total dog population. The last recorded case in a dog was in June, 1953—*i.e.*, 20 months ago.

In any rabies control campaign it is essential that adequate legislation exists to counter every move of those who, for one reason or another, attempt to evade this measure designed to protect human beings from an exceedingly unpleasant death. Legislation, even though it may have to be draconian, must be backed by an official determination to enforce it. Half-measures are unlikely to succeed. It is, perhaps, significant that the successful vaccination campaigns in the four countries quoted in the annotation—Hungary, Israel, Japan, and Malaya—were all *compulsory* ones.

6. *That the cost and effort in vaccinating all dogs would be very great.*—If a charge is made for vaccination a rabies control campaign need cost the authorities very little. One of the most promising of the newer vaccines—the chicken-embryo vaccine (Flury strain)—is produced on a large scale only in America, and its purchase would, of course, involve dollars. An alternative would be to use a potency-tested nervous-tissue vaccine injected intramuscularly, as recommended by WHO.

The effort required must be balanced against the benefits that may accrue. From the point of view of the protection of human beings there can only be one conclusion.

Yours faithfully,

C. W. WELLS,

Office of the Director of Veterinary Services,
Federation of Malaya,
Kuala Lumpur.

References

BRUCKNER, A. L. (1946) *Proc. U.S. live Stk sanit. Ass.* **50,** 37.

Bull. Off. int. Epiz. (1954). **42,** 857.

KAPLAN, M. M., GOOR, Y., & TIERKEL, E. S. (1954). *Bull. Wld Hlth Org.* **10,** 743.

KORNS, R. F., & ZEISSIG, A. (1948). *Amer. J. publ. Hlth.* **38,** 50.

MEYER, K. F. (1954). *Bull. Wld Hlth Org.* **10,** 856.

RUPPERT, F. (1954). *Bull. Off. int. Epiz.* **42,** 70.

Tech. Rep. Wld Hlth Org. No. 82, 1954.

VITTOZ, R. (1950). *Bull. Off. int. Epiz.* **34,** 37.

WELLS, C. W. (1954). *Bull. Wld Hlth Org.* **10,** 731.

ZUNKER, M. (1954). *Bull. Off. int. Epiz.* **42,** 83.
———. Office international des epizooties, report No. 354 to the 22nd Session, 1954.

The annotation on rabies in Western Germany was originally published in *The Lancet*, and Mr. Wells's letter appeared in that journal on March 26th. Both the annotation (*Vet. Rec.* **67,** 98) and the letter above have been reprinted by courtesy of *The Lancet*.—EDITOR.

PREGNANCY TOXAEMIA IN EWES

Sir,—Mr. J. P. Pickering's communication in the correspondence columns of THE VETERINARY RECORD, March 19th, interested me, as he records the appearance of pregnancy toxaemia during the recent adverse climatic conditions.

Mr. Pickering's conclusions appear sound but they are not quite original. There is seldom something quite new these days. It appears that a former principal of the Royal Veterinary College, London, was one of the first to attribute what is now known as pregnancy toxaemia in ewes to a deficient diet in the latter half of pregnancy. Mr. Pickering appears to have missed the contribution "Pregnancy Toxaemia in Grassland Flocks," by Mr. J. R. Holmes, which appeared in THE RECORD on May 16th, 1953. Mr. Holmes draws attention to the statement of Groenewald *et al.* (1941) which credits Steel (1890) with having been the first to describe under the name "parturient fever in sheep" a condition which was undoubtedly pregnancy toxaemia.

It would appear that Steel may have been influenced by the contributions of Robertson ("Anaemia in sheep, known also by the terms 'Wasting,' 'Hunger Rot,' 'Blood Rot,' etc." *Jour. Roy. Agr. Soc. England*, Vol. XXI, Part I, 1885, and "Common diseases attendant on parturition in the cow and ewe," a lecture delivered to the Kingscote Agricultural Association on Friday, October 28th, 1887. (A printed copy of the lecture found in a bookshop in London.))

As these contributions appear to have been missed by those interested in sheep diseases I would quote verbatim some of the relevant passages. Some of them may interest those who are engaged in the study of metabolic diseases in livestock.

Robertson (1885) writes:—"It appears as one of those diseases of the assimilatory system generally, which within late years have been brought more prominently under our notice through the very considerable changes in stock management which have marked the progress of modern agriculture." It was many years later that the First Grassland Conference was held in London.

Another relevant passage reads: ". . . amongst breeding ewes at the period of lambing, when these have been kept and fed pretty closely upon wintergrown grass on lands in rich manurial condition."

Another observation reads: ". . . I have, however, observed a marked tendency, in all fatal cases which have been examined, to *structural alterations in the liver**, a condition which may be said uniformly to exist in ewes feeding upon fresh and actually growing wintergrass, where the same anaemic state reaches its crisis at the period of lambing."

He stresses that certain feeds may be useful "when used in conjunction with others calculated to yield the various *forms of albumen** so essential for health and animal nutrition . . ." He then observes also: ". . . luxuriant autumn-grown grass is found to operate detrimentally upon breeding ewes, when these are confined to it during the middle or most critical period of gestation. Grass, although apparently luxuriant and in full quantity in October, is not the same in character as in June or July." Robertson was evidently a keen observer and did not accept everything which the chemists preached, for he writes: ". . . if chemical analysis is resorted to for information, we are told that the wintergrown grass is only inferior to the best July samples, in so far as it contains 10 per cent. more water, the other flesh-forming and heat-producing materials being in no way diminished. Practical experience, however, tells us that the results of feeding upon these two varieties are very different, and that with pregnant animals such foods may not be extensively employed with impunity."

Those who consult his first-mentioned communication will find that several diseases are grouped under the name "Anaemia in Sheep."

In his lecture of 1887 he remarked: "As to feeding breeding ewes, there was a good deal to be learnt. Ewe stock was the most profitable of any in Great Britain, and anything that conduced to the saving of the lives of the animals was worth knowing. A good deal of attention would be required to know how to get the ewe stock profitably and healthy through the winter, winter keep being scarce."

Veterinary surgeons must continue to use their powers of observation and record their findings. Their recorded observations will be of great value to the biochemists who have not yet solved all veterinary problems of metabolic origin.

I hope that Mr. Pickering has not been discouraged by me to record his observations in future. The literature dealing with veterinary science is voluminous. It is perhaps not unreasonable to expect research workers to be somewhat more familiar with the literature on subjects which they deal with.

Yours faithfully,

P. L. le ROUX,

Department of Parasitology,
London School of Hygiene and Tropical Medicine,
Keppel Street (Gower St.), London, W.C.1.

March 20th, 1955.

*Italics not in original.

ADVERTISER'S ANNOUNCEMENT

Easter Holidays

Bayer Products Ltd., wish to advise veterinary surgeons that over the Easter holidays, Friday, April 8th to Monday, April 11th inclusive, urgent supplies of Bayer veterinary products can be obtained from Messrs. John Bell & Croyden, 50, Wigmore Street, London, W.1. Telephone: WELbeck 5555. Telegrams: "Instruments, Wesdo," London.